Critical Success Factors for ERP Deployments

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Abstract. As pre-packaged multi-module software solutions, Enterprise Resource Planning (ERP) systems do not necessarily satisfy by default the needs of the entities where they are deployed, and require customization and sometimes additional development in order to satisfy the end-users' requirements. Due to several reasons, many ERP implementation projects are geared towards failure, out-of-budget deployments, implementations unable to deliver the expected functionality or, in the best of cases, delays. As a consequence, the study of implementation success has become a relevant research issue in the ERP field. This article contributes to this subject by presenting a novel taxonomy of the critical factors that can lead to thriving ERP projects, gathering information from ERP implementations in the private, public, and international sectors.

1 Introduction

Enterprise Resource Planning (ERP) systems are commercial-off-the-shelf (COTS) tools implemented as multi-module application software geared towards the integration of business processes and functions within and across functional areas in a company or organization. ERP applications are configured, customized, and commonly extended (through additional development or third-party add-ons) in order to match the organizational processes and needs. ERP suites usually support several business activities such as, for example, administration, finance, marketing, sales, manufacturing, and distribution.

A useful step in the planning of an ERP implementation is the identification and categorization of the critical success factors (CSF) of the project. The CSF approach was proposed by Rockhart [1, 2] based on the work of Daniel on success factors [3]. Multiple classifications for CSF have been proposed in a wide range of areas, such

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as, for example, security management, strategic management, e-commerce, and technology selection. The uniqueness of each ERP implementation, the specific functional matching of ERP applications capabilities and business needs, the emphasis of ERP developers on the requirements of entities in the private sector, and the large number of deployment failures, demand a specific approach for the organization of CSF in ERP implementations.

With this intention, this study proposes a different categorization of CSF in ERP deployments, classifying them by organizational type (private, public, and international) and doing a separate CSF analysis for each. The division of CSF as presented in this article had not been done before, to the best of knowledge of the author.

The remainder of this article is structured as follows. A categorization of CSF in the private, public, and international sectors is introduced in Section 2. Concluding remarks are presented in Section 3.

2 Critical Success Factors

Critical: crucial, decisive, indispensable, vital. *Success:* accomplishment, achievement, triumph, victory. *Factor:* agent, component, constituent, element. *Critical success factors* are key areas of performance that are essential for the accomplishment of a mission or project, i.e., the fields in which satisfactory results ensure the attainment of goals [4, 5]. Although most managers may implicitly take into account these areas in directing their operational activities, these elements provide a common point of reference for the entire organization or enterprise (e.g., in an ERP deployment) when they are explicitly identified [5].

2.1 Previous categorizations of CSF in ERP projects

Former studies on CSF for ERP usually proposed the categorization criteria of CSF as one of three major types. *Perspectives*, different points of view have been used to separate CSF, such as the nature of the ERP implementation process (see, e.g., [6-8]); *project implementation*, the factors are classified according to the project implementation phase (see, e.g., [9, 10]); and *no criteria*, some researchers have simply enumerated their CSF without any categorization (see, e.g., [11-13]).

2.2 A categorization of CSF for ERP by organizational types

In order to classify the different CSF, it was decided to identify the major entities and elements that participate in an ERP implementation: *Company, organization, or institution* where the deployment takes place; *software integrator*, a third-party that may take the responsibility of setting up the ERP application (replaceable by an internal team); *software application*, the ERP suite; *project*, the planned undertaking

for the implementation; and *other stakeholders*, any third-party that participates or influences the outcome of the ERP deployment.

For the private field, information was gathered through a documentary examination that included sources that reported on direct experience [6, 8, 11, 14-17]. Likewise, a literature review was the source for the public field analysis [13, 18-21]. In order to determine the CSF for ERP implementations in an international environment, members of the internal ERP deployment teams of six international organizations were contacted.

The separation of CSF by organizational category presented in Table 1 facilitates to identify the factors that are common to all types of implementation, and also to find those that could be unique to a given organizational category. Only the factors that were most commonly presented or that seemed to have the most impact were included. An empty cell means that the factor was not observed in the analyzed implementations for the given organizational division.

In the private field, the most relevant factors were the end-user training, the management support, and the project planning/organizational change. In the public sector, communication and management support were the most important elements. In the international arena the project staffing was identified as the most significant factor, followed by the end users.

When performing an entity/element assessment across organizational types, the most relevant element was, as expected, the implementation project, followed by the company, organization, or institution where the deployment takes place. Although the most important elements were always the project and the organization, the remaining three elements have a unique order in each one of the organizational categories under analysis. This could confirm our hypothesis that the division by organizational types is a useful classification criterion for CSF in ERP implementations, but this conclusion requires further validation.

3 Concluding Remarks

Proposing specific CSF by organizational types offered the advantage of using the fact that ERP applications are developed focusing mostly on the private sector as an intrinsic element during the CSF assessment. Furthermore, it also allowed us to take into consideration the fact that resources, structures, and organizational cultures are generally unique in each organizational category.

In our analysis, no major differences were identified across the organizational types taken into account, although only 53.57% of the factors were common to all categories and 28.57% were unique. Surprisingly, some issues that could be considered as important were regarded as irrelevant, e.g., communication in the international case or the business needs in the public one. In general, end users, project staffing, project planning, management support, organizational change management, and the project team were the most relevant factors in the

implementations analyzed. The elements project and organization accounted on average 77.93% of the CSF.

Table 1. CSF in ERP deployments by organizational type

Entity/Element, CSF	Private	Public	Intl.	Average
PROJECT	52.00%	56.67%	51.16%	53.28%
Staffing/casting	5.33%	6.67%	13.95%	8.65%
Project management/planning	8.00%	6.67%	6.98%	7.21%
Organizational change	8.00%	6.67%	4.65%	6.44%
Internal project team	4.00%	3.33%	9.30%	5.55%
External project team	5.33%	3.33%	6.98%	5.21%
Communication	5.33%	10.00%		5.11%
Project objectives	5.33%	3.33%	4.65%	4.44%
Project management team/Steering Committee	4.00%	6.67%	2.33%	4.33%
Business justification	2.67%	6.67%	2.33%	3.89%
Documentation		3.33%		1.11%
Risk management	2.67%			0.89%
Project Sponsor/Champion	1.33%			0.44%
COMPANY/ORGANIZATION	32.00%	23.33%	18.60%	24.65%
End users	14.67%	3.33%	9.30%	9.10%
Management support	10.67%	10.00%		6.89%
Technology	5.33%	3.33%	2.33%	3.66%
Business needs	1.33%		4.65%	1.99%
Organizational culture		3.33%	2.33%	1.89%
Political structures		3.33%		1.11%
SOFTWARE APPLICATION	8.00%	6.67%	16.28%	10.32%
Software capabilities	4.00%	3.33%	4.65%	3.99%
Flexibility	2.67%	3.33%	4.65%	3.55%
Interface with legacy/other systems	1.33%		6.98%	2.77%
SOFTWARE INTEGRATOR	2.67%	10.00%	9.30%	7.32%
Customization	1.33%	6.67%	4.65%	4.22%
Fit-gap identification capabilities	1.33%	3.33%	4.65%	3.11%
OTHER STAKEHOLDERS	5.33%	3.33%	4.65%	4.44%
Knowledge from past deployments	1.33%	3.33%	2.33%	2.33%
Keeping of internal project team			2.33%	0.78%
Troubleshooting	1.33%			0.44%
Multi-site issues	1.33%			0.44%
Performance measures	1.33%			0.44%

As major open issue remains the improvement of our proposal, for example, by diminishing the number of factors or by including an additional layer, such as the project stages, or by including direct feedback from software providers and integrators. Furthermore, even though the results of our study were gathered from real deployments, the validation and application of our conclusions are still to be seen in future ERP implementations.

References

1. J.F. Rockhart, Chief Executives Define Their Own Data Needs, *Harvard Business Review* **57**, 81-93 (1979).
2. J.F. Rockhart and C.V. Bullen. A Primer on Critical Success Factors, Technical Report, Center for Information Systems Research, MIT, Cambridge, USA, 1981.
3. D.R. Daniel, Management Information Crisis, *Harvard Business Review*, **39**, 111-121 (1961).
4. H. Kowssarie, Critical Success Factor: An Exploratory Study of the University College Library in Boras. Technical Report 2001:60, University College of Boras, Boras, Sweden, 2001.
5. R.A. Caralli, The Critical Success Factor Method: Establishing a Foundation for Enterprise Security Management, Technical Report CMU/SEI-2004-TR-010, Carnegie Mellon University, Pittsburg, PA, USA, July 2004.
6. C.P. Holland and B. Light, A Critical Success Factors Model for ERP Implementation, *IEEE Software* **May-June**, 30-36 (1999).
7. J. Esteves-Sousa and J. Pastor-Collado, Towards the Unification of Critical Success Factors for ERP Implementations. In Proceedings of the 10th Annual Business Information Technology Conference (BIT 2000), Manchester, UK, 2000.
8. J. Yingjie, Critical Success Factors in ERP Implementation in Finland. Master's Thesis, Swedish School of Economics and Business Administration, 2005.
9. F. F-H. Nah, J. L-S. Lau, and J. Kuang, Critical Factors for Successful Implementation of Enterprise Systems, *Business Process Management Journal* **7**, 285-296 (2001).
10. M. Al-Mashari, Implementing ERP through SAP R/3: A Process Change Management (PCM) Perspective, *King Saud University Journal* **14**, 25-37 (2002).
11. Y.F. Jarrar, A. Al-Mudimigh, and M. Zairi, ERP Implementation Critical Success Factors - The Role and Impact of Business Process Management, In Proceedings of ICMIT 2000, pp 122-12, IEEE, 2000.
12. J. Gunson and J-P. de Blasis, The Place and Key Success Factors of Enterprise Resource Planning (ERP) in the New Paradigms of Business Management, Technical Report, SES/HEC - University of Geneva, Geneva, Switzerland, 2001.
13. O. Boon, B. Corbitt, and K. Peszynski, Reassessing critical success factors for ERP adoption - a case study. In Proceedings of the Eighth Pacific Asia Conference on Information Systems, pp. 2184-2190, Association of Information Systems, 2004.
14. J. Lian, A Study Of Prerequisites For Successful ERP Implementations From The Project Management Perspective, Technical Report, Applied Information Management Program, University of Oregon, Portland, OR, USA, August 2001.
15. E. J. Umble, R. R. Haft, and M. M. Umble, Enterprise Resource Planning: Implementation Procedures and Critical Success Factors, *European Journal of Operational Research* 241-257 (2003).
16. D.M. Strong and O. Volkoff, A Roadmap for Enterprise System Implementation. *Computer* 22-29 (June 2004).
17. P. Ramírez and R. García, Una investigación empírica sobre los factores que afectan el éxito de los sistemas ERP en Chile, *Ingeniería Informática* (April 2005).
18. D. Allen, T. Kern, and M. Havenhand, ERP Critical Success Factors: An Exploration of the Contextual Factors in Public Sector Institutions, In Proceedings of the 35th Hawaii International Conference on System Sciences, IEEE, 2002.
19. T.R. Gulledge and R.A. Sommer, Public sector enterprise resource planning, *Industrial Management & Data Systems* **103**(7), 471-483 (2003).

20. W. Brown, Enterprise Resource Planning (ERP) Implementation Planning and Structure: A Recipe for ERP Success, In Proceedings of SIGUCCS'04, pp. 82-86, ACM Press, October 2004.
21. L. Hersey-Miller, ERP Implementation Strategy & Lessons Learned: State of Delaware Case Study, April 2004.